

**SUPPLEMENTAL DECLARATION OF DR. SAMIR A. NAYFEH IN SUPPORT OF  
ENTEGRIS, INC.'S REPLY CLAIM CONSTRUCTION BRIEF**

I, SAMIR A. NAYFEH, Ph.D., have been retained by Ropes & Gray LLP to testify as an expert in this case on behalf of Plaintiff Entegris, Inc. (“Entegris”). I hereby submit this supplemental declaration in support of Entegris’s Reply Claim Construction Brief.

## **I. INTRODUCTION**

1. I make this Declaration in support of Entegris’s Reply Claim Construction Brief based on personal knowledge, my education and experience in this field, and on the documents and information referenced in this Declaration.

2. In preparing this declaration, I reviewed Pall’s Opening Memorandum on Claim Construction, dated July 30, 2010; Pall’s Opposition to Entegris’ Opening Claim Construction Brief, dated September 1, 2010; the Declaration of Igor Paul, dated September 1, 2010; and their attached exhibits. I also reviewed Entegris, Inc.’s Opening Claim Construction Brief, dated July 30, 2010; Entegris, Inc.’s Responsive Claim Construction Brief, dated September 1, 2010; and their attached exhibits. I also reviewed U.S. Patent Nos. 6,068,770 (“the ‘770 patent”), 6,378,907 (“the ‘907 patent”), 7,021,667 (“the ‘667 patent”), and 7,037,424 (“the ‘424 patent”) and their prosecution histories in light of the comments made by Pall and Professor Paul.

## **II. THE PERSON OF ORDINARY SKILL IN THE ART**

3. As stated in my July 30, 2010 Declaration, it is my opinion that one of ordinary skill in the relevant art in 1996 (and up to the present) would have a bachelor’s degree in mechanical engineering or the equivalent degree or commensurate work experience, two or more years of experience in the area of filtration and pump systems, and knowledge of their application in the semiconductor or other similar industry (D.I. 193, ¶17).

4. In 2003, in connection with a preliminary injunction motion that related to the ‘770 and ‘907 patents, I opined that a person of ordinary skill in the art did not need to have experience in filtration and pump systems (D.I 61 at 19:1-24). In 2003, I understood that the

Court (and Pall) was focusing on claim 3 of the '770 patent and claim 1 of the '907 patent for the purpose of resolving Entegris's Motion for a Preliminary Injunction. Neither claim 3 of the '770 patent nor claim 1 of the '907 patent includes a "fluid pump" or "dispense pump." In contrast, I understand that some of the claims currently being considered by the Court specifically require a pump, and I understand the parties have asked the Court to construe the term "dispense pump," in particular.

5. In order to account for the claims directed to a pump, I believe that a person of ordinary skill in the art should have experience in the area of filtration and pump systems. Because the patents' specifications indicate that the problem solved by the inventions arose in the context of contamination control in the semiconductor industry and some of the asserted claims are specifically directed to the semiconductor industry (*i.e.*, claims 9 and 10 of the '424 patent and claim 18 of the '667 patent), I also believe that a person of ordinary skill in the art should have some knowledge of the application of filtration and pump systems to the semiconductor industry, or a similar industry wherein contamination control is of paramount importance. *See, e.g.*, '907 patent at 1:18-30, 39-41, 60-63; 2:24-28; 4:3-18.

### **III. CONSTRUCTION OF THE DISPUTED TERMS**

6. I have been asked to review and comment on statements made in Pall's Opening Memorandum on Claim Construction, dated July 30, 2010, Pall's Opposition to Entegris' Opening Claim Construction Brief, dated September 1, 2010, and the Declaration of Igor Paul, dated September 1, 2010. I address some of these statements by claim term below.

#### **A. The Term "fluid processing module"**

7. The term "fluid processing module" appears in asserted claims 1, 2 and 9 of the '907 patent. I understand that the parties have proposed the following constructions for this term:

Claim Language	Entegris's Proposed Construction	Pall's Proposed Construction
"fluid processing module"	fluid separation module	fluid processing module

8. It is my opinion that the construction proposed by Entegris is consistent with the patent's prosecution history.

9. During the prosecution of the '907 patent, the Examiner required the applicants to elect one of two groups of claims for prosecution. The Examiner characterized the claims in the following manner:

[G]roup I is directed to a system or apparatus including a separation module with a filter including pumps and a connector apparatus without particular locking means or combination with the manifold of group II. The manifold of group II is not limited to a system including a filter, but to a fluid processing module. Since the manifold structure and the system of the groups above and the process of purging the system are not related or limited to a common structures [sic], the inventions are distinct.

(D.I. 192 Ex. F at ME070606). The Examiner further characterized group I as "[c]laims 1-7, drawn to a connector apparatus and process of purging a fluid deliver [sic] system including the connector," and group II as "[c]laims 8-15, drawn to a manifold" (D.I. 192 Ex. F at ME070606). One of ordinary skill in the art would understand that the Examiner was categorizing the claims into two groups as follows: group I was directed to a system for purging and group II was directed to the manifold. One of ordinary skill in the art would not understand the Examiner's statement to limit group I to claims directed only to fluid separation modules, as Pall asserts (D.I. 199 at 14). To the contrary, one of ordinary skill in the art would readily understand group I to include claims directed to both a fluid separation module and a connector apparatus.

10. This conclusion is supported by the actual claims pending at the time the Examiner made her restriction requirement. In particular, the group I claims contained both a separation

module and a connector apparatus. Independent application claim 1 (from group I), stated the following:

The process for purging a fluid delivery system of a fluid within said system, said system including means for pumping said fluid and a separation module including a separation means, said separation module having a configuration of inlet means and outlet means for delivering fluid into said separation module and removing fluid from said separation module on the outer surface of said separation module which comprises:

replacing said separation module with a connector apparatus having the same configuration on its outer surface of inlet means and outlet means as the configuration of inlet means and outlet means on the outer surface of said separation module . . . .

(D.I. 192 Ex. F at ME070432). Thus, independent application claim 1 included both a fluid separation module and a connector apparatus. Similarly, independent application claim 2 recited a separation module, and replacing the separation module with a connector apparatus.

Independent application claim 3 also recited the connector apparatus replaceable with the separation module. Independent application claims 5 and 6 both recited the connector apparatus in the context of a system for purging a dispense fluid. (D.I. 192 Ex. F at ME070432-33). Thus, each of the claims of group I incorporated a connector apparatus and a separation module.

11. Based upon my review of group I, it is my opinion that the claims of group I were not limited to separation modules, as Pall claims (D.I. 199 at 14), but were directed to the replacement of separation modules with connector apparatus.

12. Nor would one of ordinary skill in the art understand the Examiner to have expanded the group II claims to include fluid processing modules other than the fluid separation module discussed in the specification. In my opinion, one of ordinary skill in the art would recognize that the Examiner was incorrect when she stated “[t]he manifold of group II is not limited to a system including a filter but to a fluid processing module” (D.I. 192 Ex. F at ME070606). In particular, group II included application claims 8-15. These claims recited a

manifold for a fluid processing module (D.I. 192 Ex. F at ME070492-93). Unlike the group I claims, these claims did not recite a connector apparatus. As I have previously observed, the specification of the '907 patent discusses two modules – a fluid separation module and a connector apparatus. The connector apparatus is “nonworking in that it performs no function other than transferring fluid therethrough” (2:64-3:4). The fluid separation module, on the other hand, processes the fluid that passes through it to remove unwanted contaminants (3:33-36). Furthermore, because the only “fluid processing” discussed in the '907 patent is “fluid separation,” one of ordinary skill in the art at the time of the invention would understand that a “fluid processing module” is a “fluid separation module” (D.I. 193 at ¶21).

13. Therefore, in my opinion, the fluid processing module described and claimed by the '907 patent necessarily refers to a fluid separation module, which includes a filter.

**B. The Terms “vent position”, “gas vent”, and “at least one connector that is a gas vent from the housing”**

14. The term “vent position” appears in asserted claim 2 of the '907 patent. The term “gas vent” appears in all asserted claims of the '667 and '424 patents. The term “at least one connector that is a gas vent from the housing” appears in asserted claims 1, 2, 5, 14, 15 and 17 of the '424 patent. I understand that the parties have proposed the following constructions for these terms:

Claim Language	Entegris’s Proposed Construction	Pall’s Proposed Construction
“vent position”	a third connector on the fluid processing module which has the primary purpose of venting substantially all gas from the module	a position on the fluid processing module which has the primary purpose of venting gas from the module
“gas vent”	a connector which has the primary purpose of venting	Pall acquiesces to the Court’s construction in that

	substantially all gas from the module	a “gas vent” is a gas vent which has the primary purpose of venting gas from the filter module.
“at least one connector that is a gas vent from the housing”	at least one connector of the separation module performs the primary function of venting substantially all gas from the interior of the housing	At least one connector of the separation module is a gas vent. “Gas vent” has been construed by the Court.

15. In his Declaration, Professor Paul states, “as made clear in the specifications for some embodiments, venting may not be required at all” (Paul Decl. at ¶ 28). Professor Paul relies on the following language from the ‘667 and ‘424 patents to support his opinion: “[w]hen venting of gas is not a requirement, a valve or the like in a conduit in fluid communication with the vent connector can be utilized to close fluid flow through the vent connector” (‘667 patent at 5:6-9, ‘424 patent at 5:21-24). Paul Decl. at ¶ 24. I disagree with Professor Paul’s opinion that this statement in the specification negates the construction of these terms to require that substantially all gas be vented from the interior of the separation module’s housing.

16. One of ordinary skill in the art would understand the statement relied on by Professor Paul to refer to the closure of the vent connector during the filtration process – that is, when the unfiltered fluid enters the inlet, is filtered, and exits through the outlet. In particular, the statement refers to the second step of the operation wherein:

isolation valve 53 and barrier valve 54 are open and inlet valve 52 is closed and pump 50 is activated to push liquid through conduit 55 into module 2. Filtered liquid is removed from module 2 through conduit 58 under the influence of pump 50. A dispenser chamber in dispense pump 60 thereby is filled with filtered liquid.

(‘667 patent at 6:23-28, ‘424 patent at 6:38-43). One of ordinary skill in the art would understand this to mean that the gas vent connector includes a valve or similar structure that can be closed when the fluid is being introduced into the module during the second step, at a time when the bubbles are not being removed from the liquid. If the vent were opened, the filtered fluid could exit the module through the vent rather than the outlet. In my opinion, this does not mean that the gas vent does not remove substantially all the gas from the separation module’s housing.

17. The salient portion of the specification makes clear that when venting is required, however, the vent is opened and substantially all the gas is vented from the housing. The specification describes this in a third step wherein:

barrier valve 54 is closed and vent valve 62 is opened. The feed pump 50 is activated to push a small amount of liquid and any microbubbles therein out of module 2 through conduit 64.

(‘667 patent at 6:29-32, ‘424 patent at 6:44-47). One of ordinary skill in the art would understand this statement to mean that, when fluid is being pumped into the module during the third step, the vent valve is open so as to remove all microbubbles in the housing.

18. As stated in the patents’ specifications, due to the extremely small tolerances in semiconductor manufacturing (*i.e.*, circuit details in the submicron range -- that continue to get smaller and smaller), the need for control of contaminants is essential (‘667 patent at 1:25-29, ‘424 patent at 1:27-31). This includes the removal from the dispense fluid of substantially all gas. In this context, gas is a contaminant because, for example, wherever there is a bubble in the photoresist, the image would not be written correctly onto the substrate. As further indicated in the patents’ specifications, the venting process “ensures that the dispense fluid is free of potential microbubbles” (‘667 patent at 6:36-38, ‘424 patent at 6:51-53). Thus, in my opinion, one of



ordinary skill in the art would recognize that the gas vent vents substantially all gas from the module.

**C. The Term “dispense pump”**

19. The term “dispense pump” appears in asserted claims 1 and 18 of the ‘667 patent. I understand that the parties have proposed the following constructions for this term:

Claim Language	Entegris’s Proposed Construction	Pall’s Proposed Construction
“dispense pump”	a pump used to dispense in metered portions a fluid onto a substrate, such as a semiconductor wafer	a pump used to dispense a fluid

20. In his Declaration, Professor Paul disagrees with Entegris’s proposed construction because the term “metered portions” does not appear in the specifications, or in claims 1, 14, 17, or 18 of the ‘667 patent. This conclusion, however, ignores the patents’ description of the dispense pump’s operation as an intermittent process. *See* ‘667 patent at 6:14-42. For this reason, I disagree with Professor Paul.

21. Additionally, Professor Paul ignores dictionary definitions from the time of the invention, which define “dispense” as “to deal out in parts or portions.” *See, e.g., American Heritage Dictionary of the English Language* 1162 (3d ed. 1996) (D.I. 193 Ex. B at 536-37), defining “dispense” as “to deal out in parts or portions” (Ex. B).

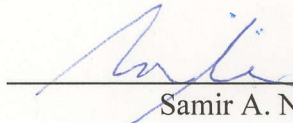
22. In my opinion, the phrase “metered portions” accurately describes the manner in which liquid is dispensed from the dispense pump as outlined in the specification of the ‘667 patent and reflects the understanding of a person of ordinary skill at the time of the invention.

#### IV. CONCLUSION

23. Based on my review and analysis to date, I have formed the opinions set forth above regarding the proper construction of various terms used in the '907, '667, and '424 patents. My investigation and analysis are ongoing. I reserve the right to modify or supplement my opinions and analysis in the future as I receive additional information.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge and that I executed this Declaration on the date below in Shrewsbury, Massachusetts.

Dated: September 15, 2010

  
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Samir A. Nayfeh

**CERTIFICATE OF SERVICE**

I hereby certify that, on September 15, 2010, true and correct copies of the Supplemental Declaration of Dr. Samir A. Nayfeh In Support Of Plaintiff Entegris, Inc.'s Reply Claim Construction Brief filed through ECF will be sent electronically to counsel for the Defendant Pall Corporation who are registered participants as identified on the Notice of Electronic Filing. A courtesy copy will be sent by the following means:

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